Alternative IV: Emphasize Attack of Follow-On Forces

Another, quite different approach to improving the conventional balance would expand current plans to acquire weapons designed to delay, disrupt, and destroy Pact forces before they come within shooting distance of NATO forces. This strategy--called follow-on forces attack (FOFA)--would improve the Pact/NATO force balance at the front by delaying or destroying some of the Pact's reinforcement units. Because weapons to accomplish the FOFA strategy are still in development, this approach would not improve capability substantially until well into the next decade. For the same reason, this option involves substantially greater risk than the previous three approaches.

FOFA weapons systems would be designed to destroy bridges and railroads deep in Pact territory and to seek out and destroy Pact units as they move from their own territory to the battlefront. If they perform as designed, such weapons could improve the balance of ground forces at the front both by destroying Pact forces and by delaying those that survive. Using dynamic analyses, and assumptions about potential capability that are conservative relative to those in other studies, this study found that FOFA could reduce the theater-wide ratio by 11 percent at a point 60 days after mobilization. Stated another way, the impact of attacking the Pact's follow-on forces would be equivalent to adding five armored divisions to NATO.

The FOFA strategy also could help shore up all of NATO's sectors. It would help most if FOFA weapons were deployed by all the allies. But even if they were deployed only in U.S. units, the attacks on bridges and railroads deep in Pact territory would disrupt all arriving units, not just those heading for U.S. units. Moreover, the missiles designed for FOFA have ranges sufficient to allow U.S. units to aid neighboring corps.

The total cost to develop and buy the munitions and systems needed for FOFA and to operate them through the year 2008 would be about $50 billion, a slightly larger investment than that required for either Alternative II or III. The bulk of these funds would be needed in the mid-1990s and thereafter, once the weapons for FOFA have been developed and tested.

Despite its potential advantages, FOFA is risky. The estimated costs could increase, which often happens as weapons approach the point of deployment. Political opposition from NATO allies and the Warsaw Pact countries, who view FOFA weapons as destabilizing, also poses problems in realizing FOFA's potential. Since most of the necessary systems are still under development and have had recent program delays, they may not be available to NATO for attacking Pact follow-on forces until later in the 1990s.

Finally, many technical and operational questions remain. Sensors needed to detect enemy units moving toward the battlefront could be attacked by the enemy, thereby diluting their effectiveness or requiring expensive defenses. Moreover, the weapons used to destroy enemy forces before they arrive at the battlefront are sophisticated and have not yet been tested under realistic conditions; they might not work at all, or at least not nearly as well as planned.

Comparison of the Four Alternatives

Though hard to measure, adding barriers has a positive effect on force balance, especially in the early days of a conflict. Given their relatively low cost, barriers would probably be a good investment if political obstacles can be overcome.

Analysis of the other three options suggests that, if it can be made to work for roughly the estimated cost, FOFA offers the greatest payoff. But FOFA is risky because it relies on weapons that have not yet proven their capability or cost. Thus, the Congress may want to combine one or more near-term strategies with continued development of FOFA at a pace that is slow enough to allow careful testing. Emphasis could shift to FOFA weapons when and if their feasibility becomes better established.

CHAPTER I

INTRODUCTION

One of the key defense goals for the United States is to deter, or if necessary counter with military force, an attack in Europe. The United States is joined in this effort by the 15 other members of the North Atlantic Treaty Organization (NATO), which since 1949 has been committed to treating an attack on any member nation as an attack on all members. The potential adversary in a European war is the Warsaw Pact, an alliance formed in Warsaw, Poland, in 1955 among seven nations, the principal one being the Soviet Union. The effectiveness of peacetime deterrence, and of wartime efforts, depends in part on the balance of military forces between NATO nations and those in the Warsaw Pact.

FACTORS RAISING CONCERN ABOUT THE CONVENTIONAL BALANCE

Military leaders and defense experts have recently expressed concerns regarding the balance of forces in Europe, focusing attention on the adequacy of NATO's conventional forces to deter Warsaw Pact aggression. (Conventional forces include all military forces except those employing nuclear weapons.) In particular, former NATO Supreme Commander General Bernard Rogers has stated that although NATO continues to improve in capability, the Warsaw Pact forces improve faster and so "Every year ... the gap continues to widen."1/ James Schlesinger, former Secretary of Defense, and Congressman Les Aspin, Chairman of the House Committee on Armed Services, have also expressed concerns about the Warsaw Pact's superiority in conventional forces.2/ Still other defense analysts, such as Phillip A.

1. Christopher Redman, "Battle of the Bean Counters," *Time* (June 15, 1987), p. 33.

2. David Fulghum, "Draft Revival Predicted If Nuclear Weapons Are Banned," *Army Times*, December 15, 1986, p. 3.

Karber of the BDM Corporation, feel that recent Soviet weapons developments have fundamentally shifted the balance in the Warsaw Pact's favor.3/

Several factors underlie most concerns about the balance of forces in Europe. These factors include the Pact's numerical superiority, the growing sophistication of Soviet weapons, and recent technological breakthroughs in Soviet weaponry. Concerns have also been expressed regarding the impact of potential arms control agreements on NATO's ability to deter aggression and, as a consequence, on the existing conventional balance. The recently negotiated treaty on Intermediate-Range Nuclear Forces (INF) has, perhaps, increased the importance of NATO's conventional forces. These same concerns could be heightened further if significant reductions were made in U.S. long-range nuclear weapons as a result of a new far-reaching treaty with the Soviet Union.

Numerical Superiority of the Warsaw Pact

Discussions of the conventional balance in Europe often focus on the number of weapons, troops, or combat units available to each side. Such comparisons invariably give the advantage to the Warsaw Pact. (The quantitative holdings of both NATO and the Warsaw Pact are discussed in detail in the next chapter.) NATO historically has attempted to offset the Pact's numerical superiority by fielding more sophisticated weapons. Many analysts feel, however, that weapons fielded recently by the Soviet Union are beginning to erode NATO's lead in weapons technology. In their annual statement for fiscal year 1988 on U.S. military posture, the U.S. Joint Chiefs of Staff, for example, assessed the relative position of the United States and the Soviet Union in 20 basic weapons technologies. The assessment shows that the Soviet Union equals U.S. sophistication in only six areas, but notes trends that indicate an improvement by the Soviet Union in 9 out of the 20 technologies examined.4/ To some analysts, these trends indicate an erosion of NATO's technological superiority.

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3. Benjamin F. Schemmer, "An Exclusive AFJ Interview with Phillip A. Karber," *Armed Forces Journal International* (June 1987), p. 112.

4. Joint Chiefs of Staff, *United States Military Posture for FY 1988* (1987).

Another issue of concern to some defense experts is the possibility of a Soviet technological breakthrough that would negate some of NATO's sophisticated weaponry. A striking example of a potentially significant Soviet breakthrough is the recent equipping of Soviet tanks with a special kind of added armor, called "reactive armor," designed to counter some of NATO's antitank missiles.5/ Some analysts, most notably Phillip Karber, have stated that the fielding of this relatively simple protective measure, first fielded by the Israelis in the late 1970s, could reduce the effectiveness of 95 percent of NATO's infantry antitank missiles. A serious degradation of NATO's antitank capability would certainly have a significant impact on today's balance of conventional forces in Europe.

NATO is, however, working on ways to counter this latest Soviet advance, and the U.S. Army feels that it can modify its missiles to do so. In addition, the United States has developed new uranium-enhanced armor for its tanks to make them less vulnerable to enemy antitank weapons. In short, this episode is only an example of the constantly seesawing relationship between one side's technological advances and the other side's reactions to them. It does, however, illustrate the concerns of many people within NATO regarding the vulnerability of NATO's technical advantage.

Arms Control Issues

Recent trends in arms control have heightened concerns over conventional forces. In part as a response to the Warsaw Pact's acknowledged numerical edge in conventional forces in Europe, NATO has deployed nuclear weapons for use in a conflict, should its conventional forces fail to stop a Pact invasion. Some public officials and defense experts have expressed concerns regarding NATO's ability to continue to deter Soviet aggression without the intermediate-range nuclear weapons that would be eliminated by the INF treaty--a situation that could be exacerbated if the United States' long-range nuclear arsenal

5. Reactive armor consists of small boxlike structures mounted on the outside of a tank or other armored vehicle. These boxes are constructed so that they explode on receiving a strong blow. Thus, when a projectile, such as an antitank missile, hits one of the boxes, the missile's forward momentum will be disrupted by the outward explosion of the reactive armor. Relatively slow-moving missiles, such as the U.S. TOW antitank missile, would be more adversely affected than very fast-moving projectiles, such as tank rounds.

is reduced by a START treaty (so named after the ongoing Strategic Arms Reductions Talks). Strategic weapons do, to some extent, affect the relationship between NATO and the Warsaw Pact because, even in the absence of intermediate-range nuclear weapons, these long-range weapons may deter Soviet aggression in Europe. However, reducing the nuclear weapons available to NATO in general, and to the United States in particular, could focus even more attention and place more pressure on NATO's conventional forces.

FACTORS FAVORABLE TO NATO

Not all analysts agree that the Warsaw Pact has the conventional superiority necessary to assure victory, should it decide to invade western Europe. The prestigious International Institute for Strategic Studies concluded, after an evaluation of the relative standing of NATO and the Warsaw Pact, that the "conventional military balance is still such as to make general military aggression a highly risky undertaking for either side."6/ Senator Carl Levin, after a recent examination of 13 factors that affect the conventional balance, concluded that NATO actually excelled or equaled the Warsaw Pact in 7 of the 13 categories.7/

Arguments that the INF treaty might place an undue burden on NATO's conventional forces can also be countered. Even though the treaty will eliminate ground-launched nuclear weapons that can attack targets at ranges between 500 and 5,500 kilometers, other nuclear weapons will still be based in Europe. Numerous nuclear weapons that could be employed in the event of a NATO/Warsaw Pact confrontation would remain on both sides. NATO will retain almost 3,000 cannons capable of firing nuclear shells, about 1,500 aircraft capable of delivering nuclear bombs, and more than 500 nuclear ballistic and cruise missiles deployed on submarines and surface ships. Furthermore, individual member nations of NATO have plans to increase and improve their national nuclear arsenals over the next few years.

6. International Institute for Strategic Studies, *The Military Balance, 1986-1987* (London: IISS, 1986), p. 225.

7. Senator Carl Levin, *Beyond the Bean Count* (report to the Senate Committee on Armed Services, January 20, 1988).

Indeed, even after an INF treaty is carried out, both sides may have sufficient weapons available to cover the very same targets for which the eliminated weapons were intended.

Despite the lack of consensus on the current conventional balance in Europe, almost all analysts would agree that the Warsaw Pact possesses great military capability that creates vulnerabilities for NATO and warrants improvement of NATO's conventional forces. Congressman Les Aspin has advocated improving NATO aircraft to counter Soviet armored forces and conventional arms control measures to reduce the number of Soviet tanks.8/ A task force within the Department of Defense has recommended developing weapons designed to delay Soviet offensive forces.9/ Secretary of Defense Frank Carlucci, and several other defense experts, have suggested building barriers to slow a Pact offensive.10/

Of course, any new course of action will require funding. Some of the proposals being discussed--if they take the specific forms in this study--could cost a total of $40 billion or more, much of which would be in addition to funds currently planned for the U.S. military. In a period of intense fiscal restraint, it is important to be specific about these approaches, their cost, and their potential contribution to NATO's conventional capability. That is the purpose of this study.

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8. Congressman Les Aspin, "The World After Zero INF" (speech presented to the American Association for the Advancement of Science Colloquium on Arms Control, Arlington, Va., September 29, 1987).

9. Dan Beyers, "Spending for NATO Defense to Change," *Army Times*, February 15, 1988, p. 35.

10. Frank Carlucci, as quoted by the *Washington Post* in "Carlucci Asks 'Creative' Response to NATO," December 1, 1987, p. 23. See also, Robert Komer, "A Credible Conventional Option: Can NATO Afford It?" *Strategic Review* (Spring 1984), p. 35; Congressman Les Aspin, "The World After Zero INF"; and Leon V. Sigal, "No First Use and NATO's Nuclear Posture," in John D. Steinbruner and Leon V. Sigal, eds., *Alliance Security* (Washington, D.C.: Brookings Institution, 1983), p. 108.

CHAPTER II

ASSESSING THE BALANCE OF NATO AND WARSAW PACT GROUND FORCES

There is little question that the Warsaw Pact outnumbers NATO in tanks, artillery pieces, and armored vehicles. It is less clear how this numerical advantage translates into a comparison of Warsaw Pact and NATO military capability. That relationship, generally referred to as the conventional balance of forces, depends not only on numbers but on the quality of weapons and on other factors, such as when and how quickly each side mobilizes for war.

The conventional balance in Europe has long been the subject of much study, analysis, and debate. The quantitative balance between the two sides is a function of so many factors--many of which are impossible for either side to determine with certainty--that predicting the outcome of a confrontation is nearly impossible. Useful insights can be obtained, however, by examining the relative military posture of the two sides.

Although all of the military forces--ground, air, and naval--on each side affect the overall balance, most studies of the conventional balance in western Europe focus on ground forces. This is because an invasion of Europe by the Warsaw Pact implies use of ground forces and because it is very difficult to represent accurately the interaction of air, naval, and ground forces. This study provides a quantitative assessment of the current balance of NATO and Warsaw Pact ground forces and examines the factors that influence it.

TYPES AND DISPOSITION OF MILITARY FORCES

Many types of forces affect the conventional balance in Europe. Most of them are ground forces operated by the armies of NATO and Warsaw Pact countries. These ground forces are organized into units of various sizes (see Table 1). The larger units include brigades, which in the U.S. Army generally have between 4,500 and 5,000 soldiers,

divisions that are typically made up of three brigades, and corps that include two or more divisions.

Army ground forces can also be designated as "light" or "heavy." Light units--which include airborne, air mobile, and the newly created light infantry units--rely primarily on soldiers with rifles, portable antitank and antipersonnel weapons, and towed artillery. Heavy units--which include both armored and mechanized units--are outfitted primarily with heavier equipment such as tanks, fighting vehicles, armored personnel carriers, and self-propelled artillery pieces. (For examples of these types of equipment, see the Glossary.) Tanks are tracked vehicles that are well protected against enemy attack and are equipped with various types of guns to destroy enemy vehicles. Fighting vehicles have less armor than tanks and attack other

TABLE 1. COMPOSITION OF GROUND FORCES
(Combat units only)

Unit	Typical Number of Soldiers in U.S. Units	Typical Composition a/
Company	90 to 150	3 platoons
Battalion	550 to 800	3 companies
Brigade	4,500 to 5,000	3 to 5 battalions
Division	10,000 to 16,500	3 brigades
Corps	25,000 to 140,000	2 to 5 divisions

SOURCE: Congressional Budget Office based on Department of the Army data and on CBO, *Army Ground Combat Modernization for the 1980s: Potential Costs and Effects for NATO* (November 1982), p. 59.

NOTE: In addition to the combat units listed, each unit includes administrative and support personnel. For example, in addition to three combat brigades, a typical division will include a sizeable administrative headquarters, a military police company, one or two helicopter battalions, an engineer battalion, an air defense battalion, a combat electronic warfare and intelligence battalion, several field artillery battalions, and finance, medical, supply, and transport organizations. Smaller units will include fewer of these support organizations, while larger organizations, such as a corps, will have even more.

vehicles with guns and missiles. Armored personnel carriers are designed to provide a relatively protected method for transporting soldiers. Artillery is designed to deliver large amounts of ordnance over enemy positions located up to 30 kilometers away.

Both light and heavy divisions include helicopters for transporting cargo and troops and for attacking enemy forces. Attack helicopters are heavily armed and can attack enemy tanks and other vehicles. Antitank weapons are typically missiles and can be carried individually or mounted on trucks or armored vehicles. Rifles and other smaller weapons are designed to be operated by individual soldiers.

Army ground forces may be augmented by aircraft operated by the Air Force. Usually referred to as "tactical aircraft," some of these planes are designed to repel or destroy enemy aircraft. Others are primarily designed to attack ground installations and destroy enemy tanks or other vehicles.

Disposition of Forces

Forces of these various types are deployed in several regions of Europe. The region of most interest, where the bulk of NATO's assets is located, is called the central region. It consists of an area that stretches for about 800 kilometers along West Germany's eastern border. NATO also has a southern region that includes Italy, Greece, Portugal, and Turkey, and a northern region that encompasses Denmark, Norway, and West Germany north of the Elbe river.

In peacetime, the forces of several NATO countries are deployed within the key central region (see Figure 1). The central region itself is further divided into two military jurisdictions. In the Northern Army Group (NORTHAG), Belgium, West Germany, Great Britain, and the Netherlands each contribute a corps-sized force (two to five divisions). The Central Army Group (CENTAG) comprises two West German and two U.S. corps. Though not assuming responsibility for the defense of any individual corps section, the other NATO members (such as Luxembourg, Denmark, and Canada) could contribute forces as part of NATO's strategic reserve or in defense of their national borders against a Pact attack. (In other words, Danish forces would

Figure 1.

Corps Sectors of Military Responsibility in NATO's Central Region

SOURCE: Adapted by Congressional Budget Office from Richard Lawrence and Jeffrey Record, *U.S. Force Structure in NATO* (Washington, D.C.: Brookings Institution, 1974), p. 31, and also from U.S. Army material.

NOTE: NORTHAG (Northern Army Group) and CENTAG (Central Army Group) are the two subdivisions of Allied Forces Central Europe in West Germany. The line dividing the two runs from Belgium through West Germany, just south of Bonn, and into East Germany. The West German corps north of Hamburg is part of Allied Forces Northern Europe.

defend Denmark.) Because France maintains three armored divisions in West Germany, it would presumably contribute forces as well, even though it does not participate in NATO's military council.

In the event of war, the divisions stationed in NORTHAG and CENTAG would be reinforced by units coming from the home bases of the various NATO member nations. Of all NATO reinforcements, one-third would come from the United States. The Department of Defense has therefore established a program to speed the deployment of some of these reinforcements without actually stationing the requisite personnel abroad. This program, which provides storage for "prepositioned" military equipment in Europe for U.S.-based reinforcing units, is known as POMCUS (for Prepositioned Overseas Materiel Configured to Unit Sets).

NUMERICAL COMPARISONS OF FORCES AND WEAPONS

Including indigenous forces, how many combat units of various types are there on each side? Most counts show the Soviet Union dominating the United States and, likewise, the Warsaw Pact surpassing NATO. The 1987 edition of *Soviet Military Power*--a Department of Defense publication--grants the Warsaw Pact an advantage of almost 2 to 1 in divisions, a greater than 2 to 1 advantage in tanks and artillery, and an advantage of 1.3 to 1.0 in tactical aircraft. (The data supporting these ratios are detailed in Table 2.)

Such simplistic comparisons fail to take several extenuating circumstances into account, however. First, some published comparisons, including those in Table 2, do not include any contribution that France or Spain could make to the defense of western Europe. Although not a military member of NATO, France occasionally trains with NATO troops and could contribute up to 15 divisions. And, although Spain could not contribute any combat units to Europe's defense early in a conflict, Spanish troops could serve as reinforcements. Second, the personnel figures cited in Table 2 include military personnel from all services. One could argue that ground forces would be the most crucial in a battle for possession of western Europe, especially those on active duty who are, presumably, the best trained.

TABLE 2. COMPARISON OF WARSAW PACT AND NATO FORCES

	Warsaw Pact	Ratio (Warsaw Pact:NATO)	NATO
Active Personnel	6,000,000	1.3:1	4,500,000
Division Equivalents	230	1.9:1	121
Ground Force Equipment			
Main battle tanks	52,000	2.1:1	24,250
Antitank weapons launchers	28,000	1.2:1	22,580
Artillery, mortars, MRLs	42,000	2.3:1	18,350
Tactical Aircraft	6,550	1.3:1	5,125

SOURCE: Congressional Budget Office using data from Department of Defense, *Soviet Military Power, 1987* (1987), and *Soviet Military Power, 1986* (1986).

NOTE: MRL = multiple rocket launcher.

When a comparison of active ground force personnel is made, including France and Spain on the NATO side and only those forces that would be deployed to the central region on the Pact side, the Warsaw Pact is actually slightly outnumbered--2,385,000 to 2,292,000.1/

This rough parity in total ground forces in the active military suggests another inadequacy of simply counting the number of divisions available to each side, as was done in Table 2; it ignores differences in their fighting capability. The combined forces of NATO and of the Warsaw Pact include units of varying types and sizes, and equipment of widely varying quality and sophistication. For example, U.S. heavy divisions, nine of which are included in the NATO division total, have an average of over 16,000 soldiers. Soviet tank divisions, on the other hand, typically have only about 10,500 soldiers. The division totals for each side include many units of widely differing design such as highly mobile airborne units that have no tanks at all, and tank divisions that contain approximately 300 tanks. Furthermore, this count mixes

1. International Institute for Strategic Studies, *The Military Balance, 1987-1988* (London: IISS, 1987), p. 231.

active and reserve units without differentiating in terms of quality of people, equipment, or training. (Active forces train constantly during peacetime, whereas in some countries, with the United States being the most prominent example, reserve units train only a few days a month, if at all.) Thus, a simple comparison of 230 Warsaw Pact divisions to 121 NATO divisions provides an incomplete and possibly misleading assessment of the conventional balance of forces.

The same shortcomings are also true for numerical comparisons of the air forces. The number of tactical aircraft cited in Table 2 include differing numbers of bombers, interceptors, and fighter-bombers. The totals also include aircraft of varying ages and capabilities. Thus, a simple count of aircraft available to each side is as incomplete a picture of each side's capability as are tallies of tanks and divisions.

METHOD OF THE STUDY

Rather than rely on simple counts, this study employs a method that not only reflects the quantity of weapons but also their quality, the timeliness of their arrival in the battle areas, and other factors. To keep the analysis relatively simple and easily understood, the study relies primarily on "static" comparisons. Static methods consider only the total of forces available to each side at a given time; they do not attempt to account for the progress of fighting or combat losses on either side. Such methods can, however, be used to examine how the balance changes as mobilization progresses and more forces become available to each side. In some cases--for instance, when examining the balance of forces in local areas such as corps sectors or after the war starts--dynamic assessments are more appropriate measures. Dynamic methods, which attempt to model the progress of a battle and reflect combat losses, are discussed more fully later in this chapter and in Appendix A.

Static Method

The static method used in this study is based on weapon effectiveness indices (WEI) and weighted unit values (WUV) developed by the U.S. Army. The WEI/WUV method avoids, as much as possible, subjective

assumptions concerning the conduct of war. This technique first evaluates and ranks each type of ground weapon--such as a tank, personnel carrier, or howitzer--relative to other weapons of the same type, to arrive at an effectiveness index for each weapon. Weapons are typically evaluated on the basis of their firepower, mobility, and ability to survive an enemy attack. Thus, various types of tanks receive WEI scores and are then ranked against a norm, which for tanks is the U.S. M60A1. For example, the M60A1, as the norm, receives a WEI of 1.00; the M60A3, an upgraded version of the M60A1, an index of 1.11 based on its improved fire control system and power train; and the M1A1, the newest U.S. tank, a WEI of 1.34 because of its overall superiority. Tanks of other nations are scored relative to the M60A1 in the same way. Each category of weapons, such as tanks, artillery or armored personnel carriers, then receives a relative weighting, or WUV score, based on its contribution to the unit's overall performance of its mission in either an offensive or defensive posture. As one would imagine, tanks receive a relatively high WUV factor (94 for defensive operations in Europe), and weapons such as individual rifles receive a lesser weight (3.7).

The total WEI/WUV score for an entire unit, such as a division, can be calculated using these factors. To arrive at the unit's total score, each weapon's index is multiplied by the appropriate weighting factor and all the products are totaled. The score for each combat unit, such as a U.S. light infantry division or a Soviet motorized rifle division, is then normalized against a U.S. armored division. The resulting value is called an armored division equivalent (ADE). All NATO and Warsaw Pact combat units can then, theoretically, be rated on a common basis using their ADE score. (Table 3 shows a simplified example of such a calculation.)

The Army established specific values of the WEIs for various NATO and Warsaw Pact weapons by assessing each weapon's capability. The weighting values, or WUVs, were also determined by the Army by pooling the opinions of military experts. The WEIs and WUVs used in this study were taken from a 1979 Army report that evaluated U.S. and foreign combat units and weapons that were expected to be fielded by 1986.2/ The report includes scores for almost

2. Department of the Army, U.S. Army Concepts Analysis Agency, *Weapon Effectiveness Indices/Weighted Unit Values III (WEI/WUV III)* (November 1979).

TABLE 3. SAMPLE WEI/WUV CALCULATION OF A COMBAT DIVISION

Type of Weapon	Number in Unit	Weapon Effectiveness Index (WEI)	Product (Number x WEI)	Weighted Unit Value (WUV)	Total Score (Total product x WUV)
Tanks					
M60A3	150	1.11	166		
M1	150	1.31	197		
Total			363	94	34,122
Attack Helicopters					
AH-1S	21	1.00	21		
AH-64	18	1.77	32		
Total			53	109	5,777
Air Defense Weapons					
Vulcan	24	1.00	24	56	1,344
Infantry Fighting Vehicles					
Bradley fighting vehicle	228	1.00	228	71	16,188
Antitank Weapons					
TOW missile launcher	150	0.79	119		
Dragon launcher	240	0.69	166		
LAW	300	0.20	60		
Total			344	73	25,112
Artillery					
155mm howitzer	72	1.02	73		
8-inch howitzer	12	0.98	12		
MLRS	9	1.16	10		
Total			96	99	9,504
Mortars					
81mm	45	0.97	44		
107mm	50	1.00	50		
Total			94	55	5,170
Armored Personnel Carriers					
M113	500	1.00	500	30	15,000
Small Arms					
M16 rifle	2,000	1.00	2,000		
Machine guns	295	1.77	522		
Total			2,522	4	10,088
Division Total					122,305

The division's score in terms of ADEs = division score/norm for U.S. armored division. For this example, the division score = 122,305. When it is divided by the norm for a U.S. armored division--130,458--it is converted into ADEs. In this case, the illustrative division would be worth 0.94 ADEs.

SOURCE: Compiled by Congressional Budget Office from data in Department of the Army, U.S. Army Concepts Analysis Agency, *Weapon Effectiveness Indices/Weighted Unit Values III (WEI/WUV III)* (November 1979).

NOTES: TOW = tube-launched, optically tracked, wire-guided; LAW = light antitank weapon; MLRS = multiple launch rocket system; ADE = armored division equivalent.

all existing NATO and Warsaw Pact weapons and for those weapons likely to be fielded in significant numbers between now and 1993.

These are the latest data that are publicly available. More recent assessments performed by the Department of Defense either have used different methods or have been classified. However, the method for calculating individual WEIs is also explained in the 1979 study. Thus, CBO was able to determine effectiveness indices for those few weapons not evaluated by the Army in its 1979 report.

Limitations of this Method

Like any analysis that attempts to quantify the many aspects that contribute to military capability, the WEI/WUV approach suffers from several important drawbacks. One obvious drawback is the lack of more recent WEIs for the individual weapons currently in NATO and Warsaw Pact units. This analysis, however, does not purport to be a precise evaluation of either NATO's or the Warsaw Pact's military capability. Rather, it is an attempt to assess the relative position of the two sides under a wide range of assumptions. As such, it should be viewed as representing general trends and not absolute military capability; nor should the analysis be used to predict the outcome of a conflict. Thus, if the underlying numbers used to make the assessments err by a small percentage for each side, the relative error should cancel out. Even if this is not the case--that is, if the numbers provided by the 1979 study and updated by CBO result in a bias in either NATO's or the Pact's favor--such a bias would be relatively small. Given the wide range of cases examined, the errors resulting from using somewhat outdated information should be insignificant.

This analytic method also ignores many attributes of a military unit--such as quality and training of personnel, support equipment, logistic capability, and the interplay of various weapons--that can determine the outcome of a particular battle. Despite their importance, however, these factors often do not lend themselves to easy translation into numerical values. How do you count an American reserve soldier who received annual training versus a Soviet reservist who does not train after an initial term of enlistment? Is an American reservist worth 2.0 Soviet reservists or 1.5? Does a tank driven by an